6G

Information

Professional Services Committee

Proposed Standards for Single Subject Matter Programs in Industrial and Technology Education

Agenda Insert
Addition to Appendix D

Executive Summary: The addition of Industrial Technology Education Single Subject Matter Standards to Item 6G, Appendix D.

Staff Direction: None

Presenters: Helen Hawley, Consultant; Teri Clark, Administrator, Professional Services Division

Strategic Plan Goal(s):

Goal 1: Promote educational excellence through the preparation and certification of professional educators.

- Sustain high quality standards for the preparation of professional educators.
- Sustain high quality standards for the performance of credential candidates.

Standards of Quality and Effectiveness for Subject Matter Programs in Industrial and Technology Education

Category II: Single Subject Matter Program Standards

Standard 11: Core Studies (Breadth)

Core studies in the program will include the nature of technology and develop technological literacy including: problem solving, engineering, design, technological models and systems, workplace competencies, and their interaction. The program also provides foundations in power and energy, information and communication, and project and product development. The program course work emphasizes the appropriate integration of academics, requiring higher order thinking skills to solve problems in practical situations. The program addresses issues of safety, environmental concerns and societal impact. The program includes career and employability skills in industry and education that promote appropriate attitudes for occupational success (i.e., legal and ethical responsibility, accountability and adaptability, leadership and teamwork).

Required Elements

11.1 The program introduces candidates to the structures of K-12 career pathways (building trades and construction, energy and utilities, engineering, manufacturing and product development, transportation) in industrial and technology education.

11.2 The program will provide a broad overview of career clusters, training options, work place dynamics, and employability skills (Secretary's Commission on Achieving Necessary Skills: SCANS).

11.3 The program provides candidates with varied experiences in using the engineering design process and knowledge of the product life cycle and new and emerging technologies to arrive at solutions.

11.4 The program will provide candidates with multiple and varied experiences in project and product development that focus on demonstration of innovation and design skills.

11.5 Through project development the candidate will demonstrate their understanding of factor that influences design form and function.

11.6 The program requires candidates to identify and apply correct health and safety procedures and regulations to insure safe and proper selection, uses, maintenance and repair of tools, equipment and systems.

11.7 The program demonstrates how to assess safe and proper use of equipment in the laboratory environment.

11.8 The program will provide experiences in planning, design, and management of safe laboratory facilities, including environmental concerns.

11.9 Programs will require candidates to develop an understanding of the evolution of technology and the influence of industry and technology on history.

11.10 Candidates will be required to identify and analyze the resources and controls needed to develop and understand how systems interact.

11.11 Through project-based experiences, a candidate will demonstrate an understanding of project and product management.

11.12 The course work in the program integrates other appropriate academic disciplines (e.g., mathematics, science, humanities) with Industrial and Technology Education and draws substantive connections for students.

Standard 12: Extended Studies

The program includes coursework to supplement the program core and further prepare prospective teachers in the range of subjects included in the state-adopted K-12 curriculum. Prospective teachers build upon foundational knowledge acquired in the program core by further work within or across the content domains. The program's design for extended studies provides prospective teachers with options, including both specialized and comprehensive preparation based on coherent patterns of coursework.

Required Elements:

12.1 The program offers extended studies that ensure that prospective teachers deepen their knowledge within or across content domains.

12.2 Extended study may be offered in any or all of the following patterns:

a. A combination of related content areas across one or more of these three domains: power and energy, information and communication, and project and product development.

b. Concentrations in one or more domains

c. Concentration in any content area within a domain (e.g., transportation, aeronautics, automotive repair)

12.3 The program provides advising for prospective teachers to select or develop a coherent pattern of extended study based on a well-defined goal (i.e., to meet requirements of the major; to complement or supplement studies in the program core; to pursue special professional interests, e.g., engineering technology, manufacturing, multi-media).

Standard 13: Power and Energy

The program of study will include the fundamental scientific concepts specific to power and energy with applications to mechanical, fluid, thermal, and electrical systems. The program incorporates relevant K-12 state curriculum standards into coursework and lab experiences. The program requires candidates to design, maintain and analyze a variety of power, energy, and transportation systems.

Required Elements

13.1 Coursework will teach candidates to utilize scientific principles of physics, chemistry and mathematics to solve problems and apply technological solutions to situations involving work, power, energy, and efficiency.

13.2 The program will provide experiences in power generation, storage processes, systems management, and alternative sources.

13.3 The program will provide instruction and experiences in power and energy safety, control, transmission, loads, and conversion systems.

13.4 The program will deliver instruction in the design, development, and maintenance of transportation systems and infrastructures.

13.5 The program will teach the appropriate selection and use of a variety of materials and renewable and non-renewable resources used in power and energy systems that consider environmental and consumer issues.

13.6 Candidates will develop hands-on skills with a variety of current power and energy tools and equipment.

Standard 14 – Information and Communication

The program will provide advanced course work in the fields related to information and communication technology. Course work will include information, design processes, systems, and resources. The program incorporates relevant K-12 state curriculum standards. Candidates demonstrate an understanding of the knowledge and skills needed to design, analyze, use, and maintain a variety of communication systems. Course work will provide technological content in conjunction with societal, ethical, moral and economic considerations.

Required Elements

14.1. The course work will enable the candidate to conceptualize, design, document, prototype and refine the design of products, projects and systems.

14.2. The course work will enable the candidate to analyze, understand and apply knowledge of various ways of communicating (e.g., imaging technologies, graphics, telecommunications, broadcast, information and multimedia systems).

14.3 Candidates will appropriately select and effectively use materials, tools, equipment in information and communication systems and subsystems.

14.4 Candidates will be able to apply principles of security procedures to define physical and electronic security plans.

Standard 15: Project and Product Development

The program will prepare candidates to use project and product design processes appropriate to industrial and technology education. Candidates will incorporate engineering principles, manufacturing and construction processes, resources, statistical data, and quality assurances as they relate to the universal system model (input, processes, output, feedback). The program incorporates the relevant K-12 state curriculum standards. Candidates analyze ethical, moral, and environmental issues in project and product design.

15.1 The candidate is required to use engineering principles through project development, using a variety of academic concepts and technical procedures in a lab environment, to manufacture a product safely.

15.2 Candidates will understand manual and automated manufacturing and construction processes by learning how to construct and/or maintain projects or products using plans and following regulatory codes and industry guidelines.

15.3 Candidates will demonstrate an understanding of cost, estimation, supply chain and demand dynamics.

15.4 Candidates will understand research and development concepts as they relate to operation management, including cost estimation, design prototyping, material selection, and timeline.

15.5 Candidates will demonstrate knowledge and capabilities for safe and proper use of tools, equipment, and materials.

15.6 Candidates will understand principles and procedures of product testing and design, customer feedback, industry standards (e.g., ANSI, ISO), total quality management (TQM), and change management (e.g., change orders, version control).